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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,707	01/15/2002	Young-Hoon Joo	5000-1-235	3893

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EXAMINER

CUNNINGHAM, STEPHEN C

ART UNIT PAPER NUMBER

3663

DATE MAILED: 04/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/047,707

Applicant(s)

JOO ET AL.

Examiner

Stephen C. Cunningham

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

The rejection of claim 2 under 35 U.S.C. 112 has been overcome and is withdrawn.

***Claim Rejections - 35 USC § 102***

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Spock et al. (US 6,388,805) (hereafter "Spock").

Regarding claims 1, Spock teaches an optical amplifier comprising:

a first interleaver for interleaving the channels of the forward optical signal received at a first terminal thereof and the channels of the reverse optical signal received at a second terminal thereof, in accordance with the wavelengths of the channels, and outputting an interleaved optical signal at a third terminal thereof (figure 2, interleaver 36);

an optical fiber amplifier unit, comprising a single amplifier, for amplifying only the interleaved optical signal received from the third terminal of the first interleaver and outputting the amplified optical signal (figure 2, amplifier 44); and,

a second interleaver for splitting the amplified optical signal, received at a third terminal thereof into the forward and reverse optical signals in accordance with

wavelengths and outputting the forward and reverse optical signals at first and second terminals thereof respectively (figure 2, interleaver 48).

Regarding claim 3, Spock teaches an optical amplifier comprising:

a dispersion-compensation module coupled between the third terminal of the first interleaver and the third terminal of the second interleaver and adapted to compensate for a dispersion of the interleaved optical signal (figure 7, dispersion compensation module 90; figure 7, dispersion compensation module 96).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spock in view of Uno et al. (JP 06342952).

Spock fails to disclose any reference to circulators. Uno teaches an optical amplifier comprising:

a first circulator for transmitting the forward optical signal, received thereto via the optical fiber, to the first terminal of a multiplexer while transmitting the reverse optical signal, received from the first terminal of a second multiplexer, to the optical fiber; and,

a second circulator for transmitting the reverse optical signal, received thereto via the optical fiber, to the second terminal of the first multiplexer while transmitting the

reverse optical signal, received from the second terminal of the second multiplexer, to the optical fiber.

The apparatus of Spock lacks means for routing signals from a single transmission line. It would have been obvious to correct this deficiency by utilizing the means provided in the Uno reference to route counter-propagating signal to a single directional amplifier using circulators.

Regarding claim 4, Spock teaches an optical amplifier comprising:

a dispersion-compensation module coupled between the third terminal of the first interleaver and the third terminal of the second interleaver and adapted to compensate for a dispersion of the interleaved optical signal (figure 7, dispersion compensation module 90; figure 7, dispersion compensation module 96).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uno in view of Spock.

Regarding claims 5, Uno teaches a bi-directional optical fiber transmission system. It is inherent that a bi-directional transmission system comprise:

a first optical transmitter/receiver unit for transmitting a forward optical signal composed of a plurality of channels respectively allocated with wavelengths having a desired wavelength space while receiving a reverse optical signal composed of a plurality of channels (Uno: title and abstract);

a second optical transmitter/receiver unit for transmitting the reverse optical signal while receiving the forward optical signal (Uno: title and abstract); and

an optical fiber coupled between the first and second optical transmitter/receiver units, the optical fiber serving as a transmission medium for the forward and reverse optical signals (Uno: figure 8, fiber transmission line 25 and 35).

Uno fails to teach interleaved forward and backward transmitted signals.

Spock teaches an optical amplifier amplifying interleaved forward and backward propagating signals comprising:

an optical amplifier device comprising a single amplifier arranged on the optical fiber and adapted to interleave the channels of the forward and reverse optical signals, bi-directionally received via the optical fiber, in accordance with the wavelengths of the channels, to amplify only a single interleaved optical signal generated in accordance with the interleaving operation, to split the amplified optical signal into the forward and reverse optical signals in accordance with wavelengths, and to bi-directionally transmit the split forward and reverse optical signals via the optical fiber (see discussion of claim 1).

It would have been obvious to modify the transmission system of Uno by replacing elements 26, 10 and 36 (Uno, figure 8) with Spock's interleaving amplifier elements 36, 44 and 48 (Spock, figure 2) and interleave the forward and backward signals in order to minimize four wave mixing.

With regards to claim 6, Spock teaches an optical amplifier comprising:

a first interleaver for interleaving the channels of the forward optical signal received at a first terminal thereof and the channels of the reverse optical signal received at a second terminal thereof, in accordance with the wavelengths of the channels, and outputting an interleaved optical signal at a third terminal thereof (figure 2, interleaver 36);

an optical fiber amplifier unit, comprising a single amplifier, for amplifying only the interleaved optical signal received from the third terminal of the first interleaver and outputting the amplified optical signal (figure 2, amplifier 44); and,

a second interleaver for splitting the amplified optical signal, received at a third terminal thereof into the forward and reverse optical signals in accordance with wavelengths and outputting the forward and reverse optical signals at first and second terminals thereof respectively (figure 2, interleaver 48). It would have been obvious to modify the transmission system of Uno by replacing elements 26, 10 and 36 (Uno, figure 8) with Spock's interleaving amplifier elements 36, 44 and 48 (Spock, figure 2) and interleave the forward and backward signals in order to minimize four wave mixing.

Regarding claim 7, Spock teaches an optical amplifier comprising:

a dispersion-compensation module coupled between the third terminal of the first interleaver and the third terminal of the second interleaver and adapted to compensate for a dispersion of the interleaved optical signal (figure 7, dispersion compensation module 90; figure 7, dispersion compensation module 96). It would have been obvious to modify the apparatus by providing a dispersion compensating module between the third port of each interleaver in order to reduce the accumulated dispersion.

***Response to Arguments***

Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 703-306-4171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

scc



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